OCT 24 1979

IN THE

Supreme Court of the United States

OCTOBER TERM, 1979

No. 79-506

CATHODIC PROTECTION SERVICE, A PARTNERSHIP,

Petitioner,

v.

AMERICAN SMELTING AND REFINING COMPANY (ASARCO)
AND
WAYNE BROYLES ENGINEERING COMPANY (BROYLES),

Respondents.

ON PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

RESPONDENTS' OPPOSITION TO WRIT

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October 24, 1979

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APPENDIX A-1

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RESPONDENTS' OPPOSITION TO WRIT

STATEMENT OF THE CASE

To supplement Petitioner's statement of the case we invite the Court's attention to the fact summary in the opinion of the Court of Appeals, and we include in the

Appendix a copy of the patent in suit, some of the most pertinent prior art relied upon by Respondents, which was omitted from Petitioner's Appendix D, and a more clear drawing of the Bulletin 191 Anode. We note further that the article, Appendix D13 to the Petition, which Petitioner alleges was presented to the Patent Office as prior art (Petition footnote 5, pg. 30) was not prior art, being dated October 1969, six months after the patent application was filed, and was not identified to the Patent Examiner as prior art (Plaintiff's Exhibit 44, A.975).

Petitioner failed to mention that the District Court's decision was reversed because the Court of Appeals found that its fact findings on scope and content of the prior art and level of ordinary skill in the art were clearly erroneous (Petition B-18). The error was principally due to the fact that the trial court had held certain prior art to be irrelevant, despite the fact that this prior art was from the same field of galvanic anodes and also disclosed the same functional or mechanical features as claimed in the patent, and despite the fact that such art was considered relevant by the inventor, his original patent attorney, an attorney who made a prior art search, and the Patent Office Examiner (Petition B-20). The Court of Appeals also noted that this prior art had not been disclosed to the Patent Examiner, even though much of it had been called to Petitioner's attention for this specific purpose (Petition B-9).

Defendants in the case below are Asarco Incorporated, Federated Metals Corporation and Wayne Broyles Engineering Company. All of these wish to respond to the Petition.

REASONS FOR DENYING THE WRIT

Summary

The writ of certiorari should be denied because Petitioner has made none of the showings suggested by Rule 19 of this Court. There is no showing of any conflict between the decision of the Court of Appeals in this case and that of another Court of Appeals on the Question Presented. Petitioner admits that there is no conflict between the decision in this case and the most recent applicable decisions of this Court. The alleged important question of federal law has, as is apparent from Petitioner's own argument, already been settled by this Court. Petitioner is merely saying that it does not agree with what the Court of Appeals did. There is no special and important reason given why this Court should review *this* case.

The Court of Appeals in this case specifically addressed the underlying factual inquiries required by *Graham* v. *Deere,* 383 U.S. 1 (1966), and concluded that the invention was obvious in view of prior art which the trial court had considered irrelevant. Petitioner has neither urged nor demonstrated any error in the Court of Appeals' findings on these factual inquiries.

Thus the Question Presented is devoid of any conflict, and presents no important question of federal law for this Court.

Argument

Petitioner's primary argument is that this court has, in such decisions as *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co., Inc.,* 396 U.S. 57 (1969); *Sakraida* v. *Ag Pro, Inc.,* 425 U.S. 273 (1976); and *Dann* v. *Johnston,* 425 U.S. 219 (1976), when viewed in the light of *Graham, supra,* created confusion and needless uncertainty as to how the

Patent and Trademark Office or a lower court is to approach and analyze the issue of obviousness, particularly in connection with how to deal with "secondary considerations". To support its argument Petitioner has created two allegedly distinct "methods" of deciding questions of obviousness, the "visceral reaction method" and the "Learned Hand/CCPA approach". We submit that there are not different methods, but only different fact situations, and that the various Supreme Court pronouncements on the issue of obviousness are neither confusing nor inconsistent, but in fact are remarkably consistent, considering the wide variety of fact situations that have been presented.

Petitioner's argument ignores the fact that this Court, in the *Graham* Trilogy, concluded that the enactment of 35 U.S.C. § 103 was not a change in the law but a codification of judicial precedents:

> "We believe that this legislative history, as well as other sources, shows that the revision was not intended by Congress to change the general level of patentable invention. We conclude that the section was intended merely as a codification of judicial precedents embracing the Hotchkiss condition, with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability." (383 U.S. at 17).

The Court had already noted, at 383 U.S. 12, that *Hotchkiss* v. *Greenwood,* 11 How. 248, 13 L.Ed. 683 (1851), had required a comparison between the subject matter of the patent and the background skill of the calling, and that patentability was in each case determined from that comparison. This was directly related to the requirements of Section 103, by noting that under this section "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are

to be ascertained; and the level of ordinary skill in the pertinent art resolved" (383 U.S. 17-18).

The Court then went further and noted that such secondary considerations as commercial success, etc. "may have relevancy". In the light of the Court's previous determination that Congress had not intended to change the general level of patentable invention, but had merely intended to codify judicial precedents, it is apparent that one may look to earlier decisions of the Court to determine the circumstances under which these "secondary considerations" are relevant.

In one such case, *Jungersen* v. *Ostvy and Barton Co.,* 335 U.S. 560 (1948), the Court stated:

> "It is true that in cases where the question of patentable invention is a close one, such success has weight in tipping the scales of judgment toward patentability .... where, as here, however, invention is plainly lacking, commercial success cannot fill the void." (355 U.S. at 567).

In a much earlier case, *Smith* v. *Goodyear,* 93 U.S. 486 (1877), the Court spoke in a similar vein:

> "We do not say, the single fact that a device has gone into general use and has displaced other devices which had previously been employed for analogous uses, establishes in all cases that the later device involves a patentable invention. It may, however, always be considered; and, when the other facts in the case leave the question in doubt, it is sufficient to turn the scale." (93 U.S. at 495-496).

These are only two of the many cases decided before the enactment of Section 103 and the decision in the *Graham*

Trilogy in which this principle was reaffirmed.* There is no question that the law prior to Graham was that if "invention" is plainly present or plainly lacking, the presence or absence of "secondary" factors did not tip the scales in the other direction.

The *Graham* Trilogy itself contains, in its analysis of the Cook Chemical patent, an excellent example of application of the rule concerning secondary considerations (383 U.S. 35-37). Here the Court noted the evidence of failure of others, long felt need, and commercial success, and observed that such sub-tests are "more susceptible of judicial treatment than are the highly technical facts often present in patent legislation", that such inquiries may lend a helping hand, and "guard against slipping into hindsight". Nevertheless, the Court, noting the exceedingly small differences from the prior art, held that those factors do not, in the circumstances of the case before the Court, tip the scales of patentability.

The Supreme Court cases following *Graham* which have dealt with the law on obviousness have been consistent with *Graham* and the cases preceding *Graham*.

In *Black Rock* the Court, in response to argument that the patented combination filled a long felt want and enjoyed commercial success, stated that those matters "without invention will not make patentability" (396 U.S. at 61, citing *Great A & P Co.* v. *Supermarket*, 340 U.S. 147 (1950).

In *Dann*, although there was no contention that secondary considerations supported respondent's claim of non-obvi-

*Note, for example, *Topliff* v. *Topliff*, 145 U.S. 156, 163 (1892); *Potts* v. *Creager*, 155 U.S. 597, 609 (1894); *Textile Machine Works* v. *Louis Hirsch Textile Machines*, 302 U.S. 490, 498-499 (1934); *Dow Chemical Co.* v. *Halliburton Oil Well Cementing Co.*, 324 U.S. 320, 330 (1945); and *Toledo Pressed Steel Co.* v. *Standards Parts, Inc.*, 307 U.S. 350, 356-357 (1939).

ousness, the Court noted that "commercial success without invention will not make patentability", citing *A & P*, and that such considerations may be relevant in a determination of obviousness, citing *Graham* (425 U.S. 230, fn. 4).

In *Sakraida, A & P* was cited once more in holding that desirable benefits, including commercial success, will not make patentability (425 U.S. 282-283).

Thus, as petitioner tacitly admits (Petition, p. 15), this Court's handling of the obviousness question in the cases after *Graham* is consistent with *Graham*. The law on the question is well-settled, and no reason appears for considering it further.

Contrary to Petitioner's argument, there is no confusion on the question among the courts of appeal.

Respondents have reviewed the circuit courts of appeal cases which Petitioner has selected as examples of the alleged "visceral reaction" and "Learned Hand/CCPA" approaches, and have found no instance in which a court of one circuit disagreed with a court of another circuit as to the law on obviousness, and no basis whatsoever for Petitioner's juxtaposition of the circuits. On the contrary, each of the cases cited *Graham*, and they all carefully followed the *Graham* tests in their determination of obviousness or non-obviousness. In each of the cases where the court found either obviousness or non-obviousness to be clear cut, it found it unnecessary to consider secondary factors. Where the court found a close question, secondary factors were discussed and applied. In some cases a court, having reached a conclusion of obviousness or non-obviousness, also discussed secondary factors as bolstering the conclusion which had already been reached.

Considering the divergence of fact situations which were presented in the various cases, they are remarkably con-

sistent in their application of what is admittedly a difficult legal concept.

Even Petitioner's reliance on the Court of Customs and Patent Appeals is misplaced. Although the court has on occasion relied on the secondary considerations in its determinations of non-obviousness, it has also, on occasion, found them non-persuasive. See, e.g., *In re Palmer,* 451 F.2d 1100 (CCPA 1971), cited by Petitioner. Furthermore, the CCPA does not consider its position to be inconsistent with *Black Rock* or *Graham.* In *Application of Fielder,* 471 F.2d 640 (CCPA 1973), cited by Petitioner, the court concludes that *Black Rock* is a reaffirmation of, rather than a deviation from *Graham.* The Court noted that the *Black Rock* Court "was not persuaded of non-obviousness by the showing by that patentee on the facts of that case" (471 F.2d at 645). In *Fielder* the CCPA was also not persuaded.

In the present case, the Court of Appeals, noting that six Supreme Court opinions which have dealt with the subject of invention in the last three decades guided its determination (Petition B-16), quoted the *Graham* language on standard of invention, and carefully followed this standard in its analysis of the facts of this case. After concluding from this analysis that the trial court's findings of the *Graham* facts were clearly erroneous, and that the claimed invention was clearly obvious, it noted Petitioner's urging of secondary considerations. The court observed that the trial court had used these considerations only to bolster its conclusion of non-obviousness and then, citing as authority this court's opinions in *Black Rock, A & P, Sakraida,* and *Goodyear,* held that because "the claims made here are clearly obvious, we need not examine the secondary considerations." (Petition B-33).

The court did not find it necessary to examine the foundation for the district court's findings on secondary considerations. If it had done so it would have found that the findings were clearly erroneous. Contrary to the finding of the district court on commercial success, for example, the patented anodes made little impact in the industry. Petitioner itself continued to sell the prior art Bulletin 191 Anode (A.536). One of its competitors sold the Bulletin 191 Anode continuously, had been unable to sell the allegedly infringing design, and had lost only two orders to the Petitioner in five or six years (A.632). Respondent, ASARCO, sold only four orders of the allegedly infringing design, all other sales being of the Bulletin 191 design (A.640-641). Defendant Broyles never lost any customers to the patented design and did not detect any diminishing in sales of the Bulletin 191 design (A.701).

It is apparent, therefore, that any success that Petitioner's anode design had was based soley on Petitioner's efforts to market its patented design rather than the prior art design. Certainly, the patented design did not supplant or practically eliminate sales of the Bulletin 191 anode, as found by the district court.

The real issue in this case, as indicated by the Question Presented, is only whether the Court of Appeals was correct in holding, on the facts of this case, that the patent in suit is invalid. That issue is of no importance to anyone except the parties to this case, and should not be the basis for the grant of certiorari.

Conclusion

The law on obviousness under § 103 of the Patent Laws was thoroughly explored by this Court in *Graham.* Since then, opinions of this Court and of the Courts of Appeal

have followed the instructions in *Graham*. Different fact situations necessitated different results. In the present case the Court of Appeals followed the same instructions. The facts found compelled the conclusion of obviousness. The petition should therefore be denied.

Respectfully submitted,

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Dec. 12, 1972 G. L. DOREMUS ET AL Re. 27,529

GALVANIC ANODE

Original Filed April 21, 1969

FIG. 1

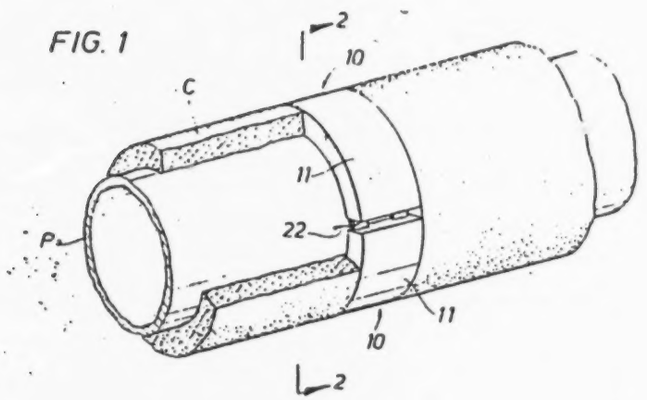
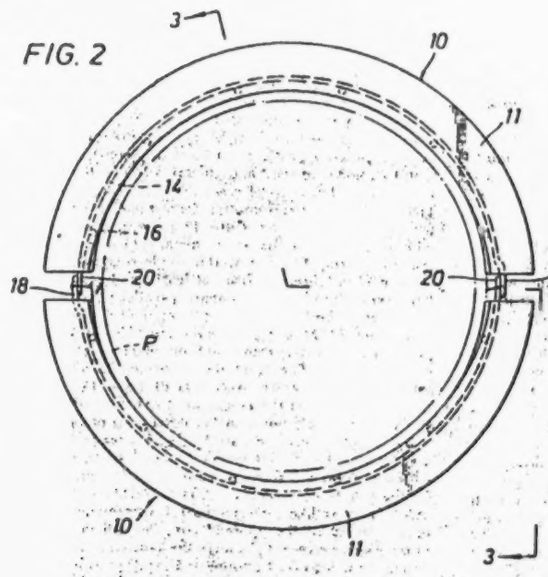


FIG. 2



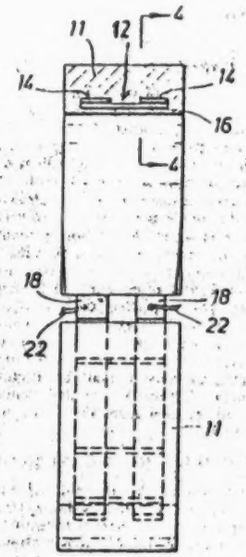


FIG. 3

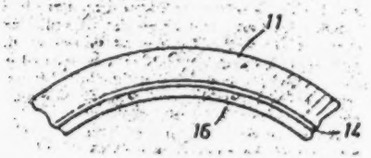


FIG. 4

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Jack G. Davis
INVENTORS

BY

ATTORNEY

United States Patent Office

Re. 27,529
Reissued Dec. 12, 1972

1

27,529

GALVANIC ANODE

Gordon L. Doremus, 7555 Haywood Drive 77017, and Jack G. Davis, 3600 Montrose, Apt. 405 77006, both of Houston, Tex.

Original No. 3,616,422, dated Oct. 26, 1971, Ser. No. 817,916, Apr. 21, 1969. Application for reissue Aug. 7, 1972, Ser. No. 277,381

Int. Cl. C23f 13/00

U.S. Cl. 204—197 14 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

A galvanic anode adapted particularly for the cathodic protection of relatively large diameter pipelines submerged in water bodies. The anode consists of *at least* a pair of [semicylindrical] *arcuate* segments constructed of a suitable galvanic metal and having completely embedded within the galvanic metal steel core or armature sections, adapted to be connected together to join the anode sections into a "bracelet" about the pipe.

BACKGROUND OF THE INVENTION

Cathodic protection of submerged pipe lines is currently accomplished by means of so-called bracelet anodes which conventionally consist of semicylindrical segments each fabricated from a plurality of arcuate anode segments, each of which has a longitudinal steel core protruding from the opposite ends thereof. The protruding ends of the cores are welded to semicircular steel bands external to the anode material. The construction of this type of anode is wasteful of labor in requiring multiple handling of the several pieces in forming each bracelet segment. Moreover, the resulting half-bracelets are mechanically weak and often badly deformed in shipping and handling. This is particularly true where anodes are required for relatively large diameter pipe lines, for example 24 inch and larger, for which a relatively large number of arcuate segments are required to make up each half bracelet. This conventional construction also results in a large area of exposed bare steel demanding protective current of its own from the anode material unless properly coated.

SUMMARY OF THE INVENTION

The deficiencies of the above-described conventional bracelet anodes are obviated by the *preferred* construction contemplated by the present invention wherein each half-bracelet is cast *preferably* as a continuous semicylindrical segment of anode metal in which is completely embedded, during casting of the anode, a concentric steel core or armature. The latter consists of a pair of spaced-apart, parallel straps made from mild sheet steel *preferably* cross-linked with small diameter steel rods. The ends of the cores protrude from the ends of the anode segments and are provided with offset portions of complementary shape adapted to form the joints by which the segments are connected together to complete the bracelet. Short bending tabs are provided for attachment to the armature joints for electrically connecting [the cores] *each strap* to the (cathodic) pipe metal to be protected.

Other and more specific objects and advantages of this invention will become more readily apparent from the following detailed description when read in conjunction with the accompanying drawing which illustrates a [useful] *preferred* embodiment in accordance with this invention:

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partly in section, showing the anode, in accordance with *the preferred embodiment of* this invention, mounted on a pipeline which is also encased in a protective and weighting coating of cement;

FIG. 2 is an end elevational view of the anode;

FIG. 3 is a side view partly in elevation and partly in section taken on line 3—3 of FIG. 2; and

FIG. 4 is a fragmentary cross-sectional view taken along line 4—4 of FIG. 3.

Referring to the drawing, the anode comprises *at least* a pair of identical *of arcuate but preferably* semicylindrical segments, designated generally by the numerals 10, and adapted when joined at their ends, to completely embrace a pipe P to be protected thereby. By reason of their identical construction, the description of one segment will be equally applicable to the other.

The segment 10 comprises a solid one-piece, semicylindrical body 11 of a suitable anode metal, such as zinc, aluminum, magnesium and alloys thereof, and is formed to an inner radius substantially equal to that of the outside of the pipe about which *it* is to be disposed so as to fit closely thereabout. The angular length of body 11 is made slightly less than 180° to provide a short open space between the opposed ends of the segments to accommodate the joints between the core sections by which the anode segments are connected together as will appear subsequently. The several end surfaces of body 11 are made substantially flat as illustrated.

Body 11 is provided with an armature or core, designated generally by the numeral 12, constructed of a metal cathodic to the anode metal. Preferably the metal is mild steel but may be any other metal sufficiently below steel in the electromotive force scale to be effective for cathodic protection. Core 12 is completely enclosed within the body of the anode metal which is cast about the core during forming of the anode segment.

Core 12 is fabricated from at least two bars 14—14 of flat steel disposed in spaced-apart, parallel relation. [and] *To enhance the mechanical and electrical integrity of the core, bars 14–14 are preferably* cross-linked by a plurality of angularly-spaced, small-diameter steel rods 16 to provide a latticelike structure is formed to a curvature substantially concentric with that of body 11 and on a radius intermediate the inner and outer radii of body 11, so as to lie closely adjacent the inner wall of body 11.

The length of *each of* bars 14 [are] *is* made sufficiently greater than the angular length of body 11 to project short distances from the opposite ends of the latter. One projecting end 18 of each bar is offset laterally outwardly to define a socketlike joint member for receiving the non-offset end 20 of the opposed core bar which forms the other joint member by which the cores of the opposed anode segments may be connected together as by welding, in order to complete the bracelet-type anode for the pipe about which it is mounted, as best seen in FIGS. 1 and 2.

Since these bracelet-type anodes are ordinarily installed over the conventional corrosion barrier coating on the pipe, short bonding cables 22 may be secured to the completed bracelets, preferably at the joints between the core segments, and suitably bonded to the pipe metal to complete the protective circuit.

When the described anodes have been placed about pipe P and the cores connected to the pipe, as seen in FIG. 1, the pipe, particularly if it is to be submerged in marine bodies, may be encased with cement C (FIG. 1) for weighting and additional protective purposes in accordance with conventional practices.

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From the foregoing, it will be evident that the bracelet anodes [constructed] *based on the preferred construction* in accordance with this invention, provide a simple, easily fabricated, solid structure, which may be installed with a minimum of labor cost to provide highly effective cathodic protection for a pipeline.

While the preferred embodiment of this invention desirably employs only a single pair of segments to minimize the amount of exposed steel external to the cores and to minimize the number of required welds, it will be apparent to those skilled in the art that a plurality of such segments could be employed without departing from the scope of this invention, since the steel bands within the segments would be entirely embedded and only their end portions projecting from the segments would be exposed.

What we claim and desire to secure by Letters Patent is:

1. A galvanic anode for cathodic protection of pipe lines, comprising:

(a) a pair of semicylindrical segments adapted to embrace a pipeline, each segment comprising:

(1) a continuous, semicylindrical body of a galvanic anode metal;

(2) A metal core cathodic to the anode metal concentrically embedded entirely within the anode metal adjacent the inner periphery of said body;

(2) said core comprising:

(a) at least two axially-spaced, parallel metal bars;

(b) a plurality of angularly-spaced metal rods interlinking said bars; and

(c) each of said bars having end portions projecting from opposite, longitudinal edges of the anode body to form joint elements for connecting one of said segments to the other in pipe-embracing relation.

2. An anode according to claim 1 wherein said anode metal is a member selected from the group consisting of aluminum, zinc, magnesium, and alloys thereof.

3. An anode according to claim 1 wherein said core is constructed of mild steel.

4. An anode according to claim 1 including electric current conductor elements connected to said core for electrically connecting the core to the pipeline.

5. An anode according to claim 1 wherein one of said end portions is offset laterally to receive the non-offset end portion of an opposed bar to form the joint therebetween.

6. A galvanic anode for cathodic protection of pipelines, comprising:

(a) a pair of semicylindrical segments adapted to embrace a pipeline, each sigment comprising:

(1) a continuous, semicylindrical body of a galvanic anode metal;

(2) A metal core cathodic to the anode metal concentrically embedded entirely within the anode metal adjacent the inner periphery of said body;

(3) said core comprising:

(a) at least two axially-spaced, metal bars; and

(b) each of said bars having end portions projecting from opposite, longitudinal edges of the anode body to form joint elements for connecting one of said segments to the other in pipe-embracing relation.

7. A galvanic anode for cathodic protection of pipe lines, comprising:

4

(a) a pair of arcuate segments adapted to embrace a pipe line, each segment comprising:

(1) a continuous, arcuate body of a galvanic anode metal;

(2) A metal core cathodic to the anode metal concentrically embedded entirely within the anode metal adjacent the inner periphery of said body;

(3) said core comprising:

(a) at least two, axially-spaced metal bars;

(b) each of said bars having end portions projecting from opposite longitudinal edges of the anode body to form joint elements for connecting one of said segments to the other in pipe-embracing relation.

8. A galvanic anode according to claim 7, and a plurality of angularly-spaced metal rods interlinking said bars.

9. An anode according to claim 7, wherein said anode metal is a member selected from the group consisting of aluminum, zinc, magnesium, and alloys thereof.

10. An anode according to claim 7, wherein said core is constructed of mild steel.

11. An anode according to claim 9, including electric current conductor elements connected to said core for electrically connecting the core to the pipeline.

12. An anode according to claim 11, wherein one of said end portions is offset laterally to receive the non-offset end portion of an opposed bar to form the joint therebetween.

13. A galvanic anode for cathodic protection of pipelines comprising:

a plurality of arcuate segments adapted to embrace a pipeline, each segment comprising:

(1) a continuous, arcuate body of a galvanic anode metal;

(2) a metal core cathodic to the anode metal concentrically and entirely embedded within the anode metal adjacent the inner periphery of said body;

(3) said core comprising:

(a) at least two, axially spaced-apart metal bars;

(b) each of said bars having end portions projecting from the opposed longitudinal edges of the said segments to form joint elements for connecting said segments to each other in pipe-embracing relation.

14. The anode according to claim 13, and at least one metal rod in each segment for interlinking said bars.

References Cited

The following references, cited by the Examiner, are of record in the patented file of this patent or the original patent.

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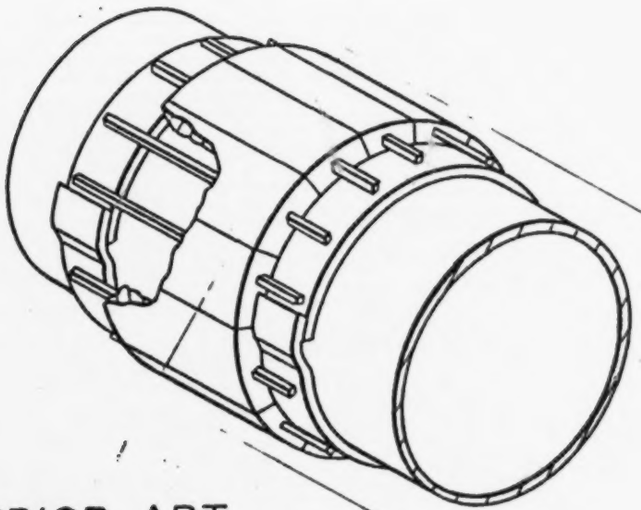
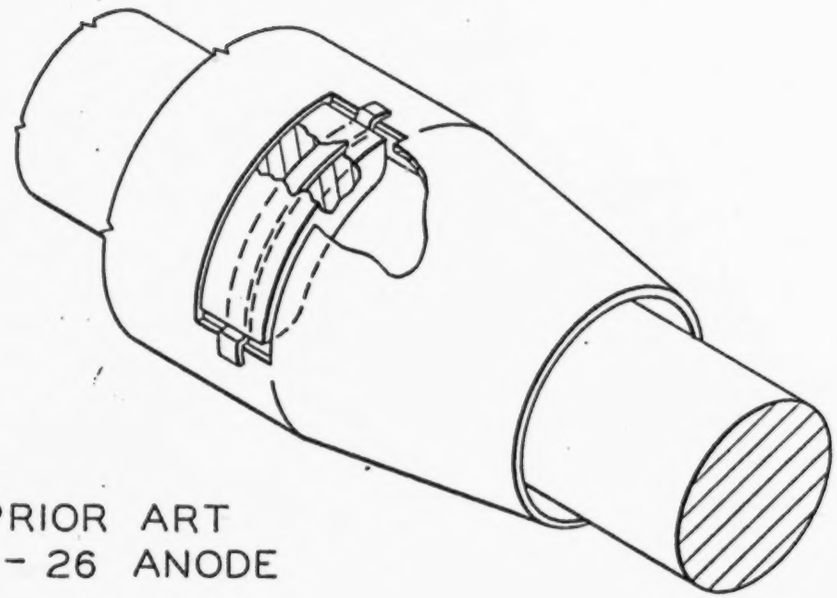
FREDERICK, C. EDMUNDSON, Primary Examiner

U.S. Cl. X.R.

204—286



PRIOR ART
THE BULLETIN 191 ANODE

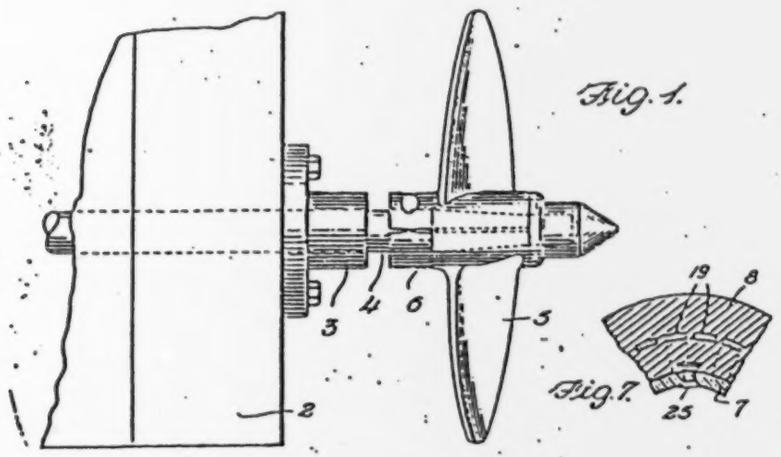


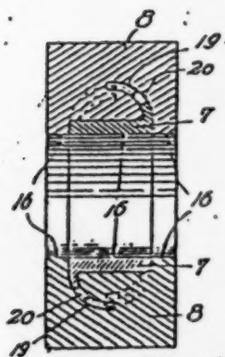
PRIOR ART
LL - 26 ANODE

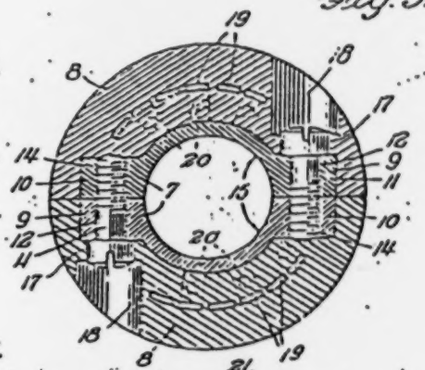
Jan. 12, 1937. B. O. GODFREY 2,067,839

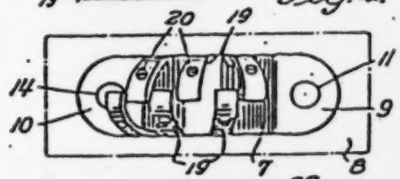
CORROSION CHECKING DEVICE

Filed July 24, 1935









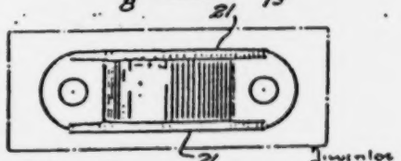
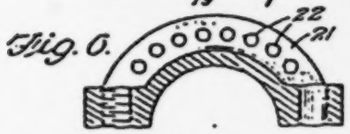


Fig. 5.



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CORROSION CHECKING DEVICE

Bert O. Godfrey, Brooklyn, N. Y.

Application July 24, 1935, Serial No. 32,932

2 Claims. (Cl. 114—65)

The object of this invention is to prevent corrosion of boat parts such as propellers, propeller shafts, stuffing boxes, or the like, which are subject to corrosive electrolytic action, by providing a metal body in metallic circuit or contact with one or more of said parts.

A further object of this invention is to construct such metal body in the form of a sectional collar comprising a foundation of metal of substantially the same polarity as that of the metal part to which the collar is attached and anchoring the said electronegative metal to such foundation in a manner that the collar will not become loose regardless of the amount of corrosion action to which the electronegative metallic part of the collar may become subjected.

With these and other objects in view, reference will be had to the accompanying drawing, wherein:

Fig. 1 is a view in side elevation illustrating a propeller, propeller shaft, stuffing box and skeg of a boat, and with the collar comprising the invention applied to the propeller shaft,

Fig. 2 is a vertical sectional view taken through the collar longitudinally of its axis,

Fig. 3 is a vertical sectional view taken through the collar transversely of its axis,

Fig. 4 is top plan view of the core of the upper section of the collar before the same is enshrouded by the electronegative metal,

Fig. 5 is a view similar to Fig. 4 of a modified form, and

Fig. 6 is a vertical sectional view of the core section of Fig. 4.

Fig. 7 is a fragmentary detail of a modification.

In Fig. 1 of the drawing, reference numeral 2 designates the keel or keel of a boat, 3 the stuffing box, 4 the propeller shaft, 5 the propeller, all of conventional form, and 6 the collar which forms the subject matter of this invention.

The preferred form of collar is illustrated in Figs. 2 to 4 inclusive, and said collar consists of two sections, each composed of a core 7 embedded in a zinc shroud 8. The core 7 is composed of a metal having a position in the electromotive series approximating that of the part to which the collar is to be attached to substantially avoid electrolytic action between the core and the said part. Were an all zinc split collar attached to a propeller shaft or other boat part, corrosion of the zinc would soon loosen the collar so that the same would not only rattle but would virtually lose its effectiveness for the intended purpose. By employing an attaching means of the nature described, these defects are avoided.

The zinc shroud 8 may be attached to the core 7 of each section in various ways to assure its attachment through a long period in the life of the zinc, but a very effective mode of attachment is by casting the zinc 8 upon or around the core.

Each core section 7 is formed with ears 9 and 10, and screws or bolts 11 pass freely through holes 12 in the ears 9 and screw into threaded openings 14 in the ears 10, clamping the collar sections tightly upon in non-rotative relation with the propeller shaft or other of said boat parts. These screws are of a metal having substantially the same polarity in the electromotive series as the metal of the core sections 7.

The adjacent faces of the ears 9 and 10 preferably do not tightly close together, but the inner semi-circular faces 15 of the core sections tightly engage opposite faces of the propeller shaft or like boat part throughout most, if not all, of their areas. Likewise, the adjacent faces of the zinc shroud do not tightly close together; but their faces 16 like the core faces may, though not necessarily, bind upon opposite sides of the shaft or other boat part. The metal of the shroud sections 8 is counter-sunk at 17 and 18 for free passage of the heads of the screws or bolts 11 into direct binding engagement with the core ears 9.

While satisfactory results may be obtained in a degree by simply enveloping the sides and outer faces of the core sections in zinc cast thereupon, a more positive anchoring means has been devised in the nature of fins or projections on the core sections, with which the metal of the shroud sections interlock, such interlocks being unaffected by corrosion of the zinc shroud through a long period of its life.

These interlocks comprise parallel annular series of integral ears 19 formed integrally with each core section 7 and the ears of one series being bent toward and partially into the plane of the ears of the other series and fitting between the latter ears. These ears may or may not be perforated as at 20 to afford additional interlocks for the zinc which flows into such perforations during the casting operation. This lateral bending of the ears 19 offsets centrifugal throw of the zinc when the collar is attached to a rotating propeller shaft or propeller.

The modified form illustrated in Figs. 5 and 6 is substantially the same structurally as the preferred form, except that parallel uninterrupted ribs are provided on the core sections and these are perforated at 22 to function like the perforations 16 in providing interlocks for the zinc shroud.

While zinc has been specified as constituting the metal of the shrouds 8, other metal standing on the electronegative side of the electromotive series from the metal of the parts of the boat to be protected may be employed. The core sections 9 and screws 14 may be of metal standing substantially in the same position as the metal of the part to be protected, and since such parts are usually of bronze, that metal is generally the one used. Where bronze propellers are used with steel shafts, zinc is used for the shroud 8 and a metal adopted for the core sections 9 from the electromotive series as will be best suited to insure longest life of the parts subject to corrosion.

The collar 6 is preferably clamped around the propeller shaft in metallic contact with the propeller or stuffing box, according to which is to be protected, though satisfactory results are obtainable by mounting the collar on the propeller shaft away from the propeller or stuffing box. Obviously the collar may be applied to any other boat part subject to corrosion through electrolytic action between sea-water and metals of different potentials in the electromotive series.

While two forms of anchoring means have been disclosed for securing the corrosive metal to the substantially non-corrosive core sections, it will be clear that the anchoring means is susceptible to many variations.

In practice the device has been found to be very effective for the designed purpose, and while a correct theory explaining its action may not be given, it is believed that the zinc or other metal selected from the negative end of the electromotive series, becomes the negative pole in an electrolytic circuit with the metals of the propeller, propeller shaft, and stuffing box, all of which are from the positive end of the electromotive series, the sea water acting as the electrolyte. In such a circuit corrosion is confined principally, if not entirely, to the most electronegative material, and is checked to a high degree in the other metallic parts.

Obviously, the core parts 7 could be constructed of bakelite or similar non-metallic material since their purpose is to provide a non-corrosive means for attaching the corrosive shroud 8 to the propeller shaft or other marine structure part, and the screws could be of the same non-metallic material, reinforced or not, or even of non-corrosive material relatively to the metal of the shroud. Metallic circuit is established between the corrosive shroud 8 and the propeller shaft or other part to which the collar is attached by a metallic plug or conductor 23 preferably of the same metal as the said propeller shaft or other part.

The present invention makes it unnecessary to run any exposed wires between parts, particularly to get around any non-conductive material placed between the zinc or negative metal and the metal part to be protected.

What is claimed:—

1. A collar for a propeller shaft comprising two semicircular sections each having diametrically opposite ears, means associated with the ears for tightly clamping the collar sections about said propeller shaft, said collar sections each having a radial extension having a trail portion disposed at an angle to the radius of the extension, and a metal negative in the electromotive series to the metal of the propeller shaft to be protected cast upon each collar section and enclosing the exposed outer surface thereof and its radial extension, said cast sections being provided with an opening affording access to said clamping means.

2. A collar for a propeller shaft comprising two semi-circular sections each composed of a relatively non-corrosive material, means associated with said collar sections for tightly clamping the collar sections about said propeller shaft, each of said collar sections having radial extensions along the outer edge thereof, said extensions being curved or arched inwardly from the outer edges of the collar section, their ends intermeshing, and a metal negative in the electromotive series to the metal of the propeller shaft to be protected cast upon the outer exposed surface of the collar section and enclosing the said curved radial extensions, said cast section being provided with an opening affording access to said clamping means.

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